DECLARATION OF JONATHAN J. RHODES IN SUPPORT OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S AND THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S PROPOSAL TO DISAPPROVE THE STATE OF OREGON'S COASTAL NONPOINT POLLUTION CONTROL PROGRAM.

I, JONATHAN J. RHODES, state and declare as follows:

1. My name is Jonathan J. Rhodes. My qualifications to offer the opinions set forth in this declaration are discussed below and addressed in greater detail in my curriculum vitae, a copy of which is attached to this declaration.

I. QUALIFICATIONS AND EXPERIENCE

2. I am a hydrologist with more than 30 years of professional experience. I have a B.S. in hydrology from University of Arizona, an M.S. in hydrology and hydrogeology from University of Nevada-Reno, and I finished all required academic work toward a Ph.D. in forest hydrology at the University of Washington. My professional experience includes work for tribal, federal, state, county, and city governments, and universities, including more than 12 years at the Columbia River Inter-Tribal Fish Commission ("CRITFC"), where I served as Senior Scientist-Hydrologist and my primary focus was the protection of salmon and steelhead habitats. For about the past eleven years, I have worked as an independent consulting hydrologist for a broad array of clients, including tribal and county governments, homeowners associations, and non-profit groups.

3. I am co-author of several scientific papers published in peer-reviewed scholarly journals regarding the functionality and importance of riparian areas and the effects of land management activities on nonpoint source pollution and water quality and resulting effects on salmonid habitats (e.g., Rhodes et al., 1994; Beschta et al., 2004; Karr et al., 2004).

4. I am the primary author of a peer-reviewed report developed under contract at the

behest of the National Marine Fisheries Service. This report (Rhodes et al. (1994) includes an extensive review of available scientific information on the effects of land management activities and their nonpoint source impacts to water quality and salmonid habitats and populations. The report also examined the importance of riparian areas to healthy functioning of aquatic systems. Rhodes et al. (1994) has been cited in numerous scholarly journals, as well as many scientific assessments.

5. I have served as a peer-reviewer for the North American Journal of Fisheries, a scholarly scientific journal, for papers related to soil erosion and stream sedimentation. I have also served as a peer-reviewer for the proceedings of an international conference for papers related to nonpoint source impacts on streams from forestry activities. For more than 20 years, a major focus of my work has been the evaluation of the effects of land use on aquatic resources, including water quality.

II. MATERIAL REVIEWED

6. In preparing this declaration, I reviewed the following:

- Chapter 2 of the Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters USEPA Report EPA-840-B-92-002, dated January 1993 and the summary of these management measures in "Oregon Coastal Nonpoint Source Program 6217 (g) Guidance Management Measures NOAA/EPA approval status" dated September 2012 (hereafter: NOAA/EPA, 2012);

- "Recovery of Wild Salmonids in Western Oregon Lowlands, A report of the Independent Multidisciplinary Science Team, Oregon Plan for Salmon and Watersheds, Technical Report 2002-1" dated July 2002 (hereafter: IMST, 2002);

- "Scientific Conclusions of the Status Review for Oregon Coast Coho Salmon (*Oncorhynchus kisutch*) Draft Revised Report of the Biological Review Team" dated May 16, 2011 (hereafter: BRT, 2011);

- Oregon Administrative Rules Oregon Department Of Agriculture Chapter 603, Division 95 Agricultural Water Quality Management Program for: Curry County Agricultural Water Quality Management Area, the Umpqua Basin, the Inland Rogue, the Mid Coast Agricultural Water Quality Management Area, the North Coast Basin, and the Coos and

Coquille area (Hereafter, collectively: agricultural rules)

- Oregon Water Quality Standards at Division 41 of the Oregon Administrative Rules

7. I also reviewed salient sections of other scientific literature, which is cited in the following and listed at the end of this declaration. Finally, I relied on my education and decades of professional experience in preparing this declaration.

III. DISCUSSION

8. This declaration focuses on the efficacy of the nonpoint source management measures for agriculture included in Oregon's Coastal Nonpoint Pollution Control Program (hereafter: CNPCP) with respect to meeting applicable state water quality standards. This declaration also assesses the adequacy of the proposed CNPCP management measures for agriculture to fully support the designated uses of streams by coldwater salmonids. Finally, I discuss the adequacy of Oregon's agricultural rules with respect to meeting state water quality standards and the protection of the designated uses of streams by coldwater salmonids.

9. The agricultural management measures for Oregon include those set out in Chapter 2 of the Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA, Jan. 1993) as incorporated in Oregon's CNPCP through their inclusion in the Oregon Department of Agriculture's Agricultural Water Quality Management Area Plans. These are also summarized in NOAA/EPA (2012). The CNPCP management measures for agriculture have several shortcomings with respect to water temperature. As a result, these proposed management measures do not ensure that Oregon water quality standards for temperature, including full support of designated uses, will be met or that nonpoint source thermal pollution will be adequately controlled.

10. The CNPCP agricultural management measures do not include a set of

management measures or practices explicitly aimed at comprehensively controlling nonpoint source water temperature impacts from all types of activities on agricultural lands. The management measures listed in a completed Agricultural Water Quality Management Area Plan for Curry County (Appendix B in ODA et al., 2012), one of six agricultural Area Plans that apply to the Coastal Zone Act Reauthorization Amendments (hereafter: CZARA) boundary area, also do not include management measures explicitly aimed at comprehensively controlling nonpoint source water temperature impacts.

11. Second, the management measures listed in NOAA/EPA (2012) and ODA et al. (App. B, 2012) do not include concrete measures to protect a width of riparian vegetation from all activities on agricultural lands that is sufficiently ample to control nonpoint impacts from agriculture lands on water temperature. The management measures in NOAA/EPA (2012) do not explicitly describe the width of riparian vegetation that should receive protection, as well as the height and density of riparian vegetation that should be achieved, in order to control nonpoint thermal pollution from agricultural lands. The management measures in ODA et al. (App. B., 2012) only discuss riparian areas within the context of riparian management and do not describe the width of riparian vegetation along streams that should be protected, and the density and height of riparian vegetation that should be achieved within this width, to provide shade to streams in order to reduce stream heating as is needed to meet water quality standards for temperature and control nonpoint source thermal pollution. These omissions constitute a major deficiency because it is extremely well-established that ample width, height, and density of protected riparian vegetation along streams is critical to controlling elevated water temperature in streams via stream shading, microclimatic effects, and the stabilizing effects of riparian vegetation on the width and depth of streams, that also significantly influences stream warming

and water temperatures (Rhodes et al., 1994; IMST, 2002; Beschta et al., 2013).

12. The agricultural rules also do not identify the width of riparian vegetation that must be protected under the rules. Although the agricultural rules generally call for riparian vegetation to be managed to provide some growth and maintenance of riparian vegetation to provide some shade (the specific language varies among the rules), none of the rules provide any description of the width of the riparian vegetation that is subject to these rules or the density and height of riparian vegetation that should be achieved. These are key deficiencies.

13. Due to rules' ambiguities related to width, density, and height of riparian vegetation, the agricultural rules do not ensure that nonpoint thermal pollution from agricultural lands is controlled. For example, although a five-foot width of riparian vegetation of site-potential height would be highly inadequate to provide enough stream shade to protect streams from elevated water temperatures due to past and present agricultural activities, such a five foot width of riparian vegetation would not be clearly inconsistent with the agricultural rules due to the rules' ambiguity regarding riparian vegetation width. Further, the rules do not require that riparian vegetation of any width achieve site-potential height. Therefore, the agricultural rules' provisions regarding riparian vegetation are inadequate to consistently ensure that agricultural lands do not cause or contribute to violations of water quality standards for temperature because they do not provide adequate direction to protect and restore a width of riparian vegetation that is adequate to provide enough stream shading to control water temperatures.

14. The agricultural rules also do not specify the height and density of the riparian vegetation along streams that should ultimately be achieved to provide adequate stream shading to control thermal pollution and contribute to meeting water quality standards for temperature. Again, a five-foot width of riparian vegetation at a height and density well below the innate

potential for the site would not necessarily be inconsistent with the rules. The height and density of riparian vegetation are key elements of stream shading and water temperature regulation in streams.

15. The agricultural rules' failure to require protection of a sufficiently ample width of riparian vegetation not only affects water temperature via shading, but also channel morphology. Riparian vegetation is critical to the maintenance and protection of channel width and depth, which, in turn, also affects water temperature (Rhodes et al., 1994; IMST, 2002; Beschta et al. 2013).

16. The grazing management measures in NOAA/EPA (2012) and ODA et al. (App. B, 2012) are not adequate to consistently protect and restore riparian vegetation as needed to control thermal pollution and contribute to meeting the water quality standard for temperature, or, at least, reduce the extent and duration of exceedances of the standard. Tthe management measures allow for approaches to riparian zone protection from grazing management that are not consistently effective at protecting and restoring riparian vegetation to a degree that fully controls elevated stream warming due to degraded riparian vegetation conditions. For instance, the management measures for grazing management summarized in NOAA/EPA (2012) deem providing salt/alternative water sources away from riparian areas and improved grazing management to be adequate approaches to controlling nonpoint source pollution. These measures, however, are not consistently effective at protecting riparian areas as needed to provide enough stream shade to control thermal pollution from grazing activities because salt and water provision outside of riparian zones does not keep cattle from concentrating in riparian zones, especially during the summer. This is because livestock tend to congregate in riparian zones during the summer due to the combination of the quality and quantity of forage in riparian

areas combined with convenient water access and thermal refuge afforded by riparian areas.

17. Slight improvements in grazing management, which would comply with the grazing management measure in NOAA/EPA (2012), are not consistently effective with respect to improving degraded riparian vegetation conditions. Improvement in grazing management can be too slight to allow the significant riparian vegetation recovery to reduce thermal pollution due to grazing impacts in degraded riparian areas. A related problem posed with the grazing management measure in NOAA/EPA (2012) is that there are no criteria for what constitutes "improved" management, leaving the provision open to broad interpretation and adoption of grazing management approaches that do not effectively protect or restore riparian vegetation and stream shading.

18. The grazing management measure in NOAA/EPA (2012) does not require consistently effective approaches to riparian vegetation protection and restoration, such as the grazing exclusion from riparian zones. Numerous scientific assessments of livestock grazing effects on riparian and stream recovery have concluded that at least several years of grazing rest are warranted to allow recovery of degraded riparian and stream systems (Clary and Webster, 1989; Platts et al., 1991; USFS and BLM, 1997). Evaluations of grazing impacts on fish habitats have repeatedly recommended the temporary or permanent elimination of riparian grazing in degraded riparian areas in order to initiate and/or accelerate the recovery of riparian vegetation, channel conditions, and fish habitat conditions, especially in degraded areas (Clary and Webster, 1989; Beschta et al., 1991; Rhodes et al., 1994; Beschta et al., 2004; Karr et al., 2004; Spence et al., 1996; Beschta et al., 2013). As a U.S. Forest Service and Bureau of Land Management publication (Leonard et al., 1997) states (emphasis added): "Livestock grazing in riparian areas, however, may not always be entirely compatible with other resource uses or values. Where soils

in riparian areas are unstable, the vegetation complex is fragile, threatened and endangered plants and/or animals are affected, aquatic or recreation values are high, municipal watersheds are involved, etc., special livestock management prescriptions must be applied. In some cases, **excluding livestock grazing may be the most logical and responsible course of action** (at least for a time sufficient to achieve a level of recovery and stability that can support grazing in the context of the management objectives)." While the grazing management measure in NOAA/EPA (2012) includes the exclusion of livestock from riparian zones as an optional approach to riparian zone protection, it lists other less effective approaches as alternative options to comply with the measure. For these reasons, this grazing management measure is inadequate with respect to thermal pollution and meeting Oregon's water quality standards for temperature, including full support of its designated uses.

19. Another shortcoming in the grazing management measures summarized in NOAA/EPA (2012) is that they do not require grazing cessation in riparian areas during the summer. Available scientific information has repeatedly indicated that grazing during the summer season is not compatible with the recovery of riparian vegetation (e.g., Platts, 1991; Kovalchik and Elmore, 1991; Leonard et al., 1997) that is vital to the control of nonpoint thermal pollution resulting from grazing impacts.

20. A major problem with respect to compliance with water quality standards for temperature, the grazing management measures related to riparian vegetation in ODA (App. B., 2012), NOAA/EPA (2012), and the related provisions in the agricultural rules, is that the width of riparian vegetation to which they apply is not defined. As a result, the provisions related to grazing management and riparian vegetation do not clearly require protection of a specified width of protected riparian vegetation that is wide enough to provide enough stream shading to

control water temperatures, even if the riparian vegetation were to reach site-potential height and density.

21. The foregoing inadequacies with respect to the attainment and maintenance of water temperatures and the protection and restoration of riparian vegetation in the Oregon agricultural rules and the CZARA management measures are significant for several reasons. First, water temperature in excess of the standard is the most prevalent documented water quality problem in lowland streams, as noted by IMST (2002). Therefore, the water-temperature related shortcomings of the agricultural rules and management measures render them inadequate to address the most pervasive documented water quality problem within the CNPCP management area.

22. Second, water temperature problems are pronounced in coastal lowland systems with significant levels of agricultural lands. For instance, the deviation between existing water temperature and potential water temperatures (with restored riparian vegetation) is estimated to increase on the Trask River as it flows downstream to the ocean (IMST, Fig. 22, 2002). This indicates that agricultural conditions contribute significantly to water temperature increases, because the fraction of riparian areas affected by agriculture also increases in the downstream direction in the Trask watershed.

23. Third, elevated water temperatures impair the beneficial use by salmonids in several ways (McCullough, 1999; IMST, 2002; BRT, 2011). A significant amount of salmonid habitat in coastal watersheds with the highest intrinsic potential for salmonid productivity has degraded water temperatures (IMST, 2002; BRT, 2011). For these reasons, the deficiencies of the management measures and agricultural rules related to the protection of riparian vegetation and water temperature are inadequate to fully protect the designated use of salmonids within the

coastal management area.

24. The provisions for stream bank protection in the agricultural rules and management measures summarized in NOAA/EPA (2012) have several other inadequacies with regard to protection of water quality and full support of designated uses. These agricultural rules and management measures do not require the protection of a sufficiently ample width of healthy riparian vegetation, which is critical to stream bank stability and protection. As previously discussed, the rules and management measures do not include any explicit description of the dimensions of the riparian vegetation that should be protected and restored. Although grazing often has profound adverse impacts on stream banks and bank stability, the grazing management measures related to riparian vegetation in ODA (App. B., 2012), NOAA/EPA (2012), and provisions in the agricultural rules, do not describe the width of riparian vegetation to which they apply.

25. The inadequacy of provisions for stream bank protection under the grazing management measures in NOAA/EPA (2012) are similar to those previously discussed for grazing and riparian vegetation and water temperature. The management measures do not require grazing management that is consistently effective at protecting riparian vegetation and stream banks. Instead, these grazing management measures allow adoption of approaches that are often ineffective at protecting riparian vegetation that is critical to protecting stream banks.

26. The inadequacies of the management measures related to stream banks are significant for several reasons. First, grazing along streams often results in significant bank damage. Cattle exert tremendous pressures on banks that cause bank damage via livestock trampling of banks (Beschta et al., 2013). Grazing impacts on riparian vegetation compounds the adverse effects of trampling on stream bank conditions (Rhodes et al., 1994; Beschta et al.,

2013).

27. Stream banks that lack adequate riparian vegetation and/or have been damaged by past and present agricultural activities contribute elevated levels of sediment to streams due to elevated bank erosion. Elevated sediment delivery to streams contributes to elevated turbidity and fine sediment levels in streams, both of which adversely affect salmonids in several ways, impairing their designated beneficial use of streams. Notably, there appears to be no threshold at which increases in fine sediment levels in streams do not impair the production of steelhead (Suttle et al., 2004). Elevated levels of fine sediment also adversely alter aquatic food webs (Bryce et al., 2010).

28. Bank damage, bank instability, and resulting elevated bank erosion also often contribute to stream widening in lowland streams, thereby contributing to water temperature elevation. Therefore, the inadequacies of the management measures related to stream banks compound the other problems related to the control of water temperatures and nonpoint thermal pollution from agricultural lands.

29. The inadequacies of the management measures and agricultural rules related to riparian vegetation render them inadequate to protect the beneficial uses of coastal watersheds by salmonids. It is quite well established that riparian zones provide many essential functions, besides those previously discussed, that are critical to fish habitat conditions that support the survival and production of salmonids (USFS et al., 1993; Rhodes et al., 1994; IMST, 2002; BRT, 2011). Healthy riparian vegetation helps arrest and detain elevated sediment delivery and reduce the delivery of nutrients and pesticides to streams from upslope agricultural activities and lands (Zhang et al., 2010).

30. Healthy riparian zones of a sufficiently ample width also provide wood to

streams, which is essential to provide cover and create the channel diversity required for unimpaired production of salmonids (USFS et al., 1993; Rhodes et al., 1994; IMST, 2002; BRT, 2011). Lowland riparian areas in the Pacific Northwest were historically important sources of large woody debris, which is critical to salmonid survival and production (USFS et al., 1993; Hyatt and Naiman, 2001; Collins et al., 2002; IMST, 2004; BRT, 2011). However, the management measures and agricultural rules do not address or provide the protection of a sufficiently ample width, density, and height of riparian vegetation that might ultimately provide adequate levels of large woody debris to streams. Therefore, due to the importance of wood recruitment to streams and its importance to salmonids, the management measures and rules are not adequate to fully protect the designated beneficial use of salmonids in coastal watersheds.

31. The foregoing inadequacies related to riparian vegetation would be reduced by unambiguously requiring the attainment of site potential height and density of vegetation within the dimensions described in "NMFS, Interim Riparian Buffer Recommendations for Streams in Puget Sound Agricultural Landscapes November 2012, Originally proposed as federal Option 3 for the Agriculture Fish and Water (AFW) Process, March 2002."

32. Another problem with the management measures and the agricultural rules is that they do not explicitly address management within floodplains that are frequently inundated by flood waters. This omission is significant with respect to water quality, because surficial deposits of pollutants in floodplains, including nutrients, livestock feces, and pesticide and herbicide residues, are swept into streams when floodplains are inundated by floodwaters. Such inundation is likely to occur with significant frequency, for instance, in the floodplain for a flood with a recurrence interval of two years. The management measures and rules' failure to address the need to ensure protection of water quality affected by relatively frequent runoff events that

inundate floodplains increases the nonpoint source pollution from agricultural lands, and fails to ensure the full support of designated uses of coastal waters.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 14th day of March 2014, at Portland, Oregon.

JONATHAN J. RHODES

LITERATURE CITED

Beschta, R.L., Platts, W.S., and Kauffman, B., 1991. Field Review of Fish Habitat Improvement Projects in the Grande Ronde and John Day River Basins of Eastern Oregon. BPA Project No. 91-069, Bonneville Power Admin., Div. of Fish and Wildlife, Portland, Or.

Beschta, R.L., Donahue, D.L., DellaSala, D.A., Rhodes, J.J., Karr, J.R., O'Brien, M.H., Fleischner, T.L., and Deacon-Williams, C., 2013. Adapting to climate change on western public lands: Addressing the ecological effects of domestic, wild, and feral ungulates. Env. Manage. DOI 10.1007/s00267-012-9964-9

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Curriculum Vitae: Jonathan J. Rhodes

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EDUCATION

1989: Doctoral candidacy degree in forest hydrology at the Univ. of Wash. Completed all requirements but dissertation.

1985: M.S. in Hydrology and Hydrogeology at the Univ. of Nev.-Reno. Thesis topic: The influence of seasonal stream runoff patterns on water quality.

1981: B.S. in Hydrology and Water Resources at the Univ. of Ariz.

PROFESSIONAL HISTORY

Sept. 2001 -- present. Principal Hydrologist, Planeto Azul Hydrology. Main duties: Analysis of water and land use effects on streams and aquatic resources, including native salmonids and their habitats; diagnosis of watershed and stream conditions; stream monitoring; development of programmatic and site-specific watershed and stream protection measures; project management. Some recent projects (and clients): Analysis of potential effects of groundwater pumping on streamflow (Conf. Tribes of the Umatilla Indian Reservation, OR); diagnosis of watershed and stream conditions in an urbanized watershed (West Multnomah Soil and Water Conservation District, OR); analysis of data on sediment effects on ESA-listed salmon in the South Fork Stillaguamish River, WA (Snohomish County, WA). See list of clients at the end of the CV.

Aug. 1990 -- Sept. 2001. Consulting hydrologist for non-profit organizations. Past projects (and clients) include: hydrologic characterization of remnant marsh proposed as urban wildlife refuge/greenspace (Multnomah Co. Parks Dept, OR); review of aquatic effects of: quarry expansion (Friends of Forest Park, OR), urban construction (homeowners consortium, W. Linn, OR); forest manipulations on streamflow (Pacific Rivers Council).

Apr. 1989 -- Sept. 2001. Senior Fishery Scientist-Hydrologist, Columbia River Inter-Tribal Fish Commission. Main duties: Administration and implementation of projects monitoring channel change from land use; development of programmatic and site-specific land management plans to ensure protection of watershed integrity, water quality and aquatic resources; development of restoration plans for watersheds degraded by grazing, roads, logging, and mining; design of plans for monitoring watershed and stream erosion, sedimentation, water quality, and habitat conditions; review of land management plans for adequacy of protection of aquatic resources; field evaluation of watershed and channel conditions throughout the Columbia Basin; expert witness testimony; development of technical recommendations for policy staff for protection of natal habitat for anadromous fish; review of state and federal aquatic resource monitoring plans; report and proposal writing; and, participation in various state and federal technical work groups.

Aug. '84 -- Apr. '89. Research assistant, College of Forestry, Univ. of Wash. Main duties: analysis and interpretation of water quality-quantity data; technical report writing; design and maintenance of water chemistry and quantity monitoring network in a coastal forested watershed; training in data acquisition techniques; public presentation of findings.

July -- Oct. 1987 and May -- Oct. 1988. Consulting hydrologist, Tahoe Regional Planning Agency, CA and NV. Main duties: field delineation and mapping of riparian zones, wetlands, and erosion-prone areas.

June -- Sept. 1985 and July 1986. Research assistant, Dept. of Geophysics, Univ of Wash. Main duties: operation of field station for glacier research on Mt. Olympus, Wash.; measurement of snow and glacier melt rates; mapping of supra- and extra- glacial streams contributing to basal sub-glacial flow rates on surging and non-surging glaciers in the Alaska Range, Alaska.

Jan. 1984. Consultant with C.M. Skau, Reno, NV. Main duties: field evaluation of logging roads for erosion potential and sedimentation risk; recommendations for placement of future roads to minimize erosion and sediment delivery to fish-bearing streams in coastal Northern California.

Oct. 1983 -- June 1984. Hydrologic Tech., USGS, Carson City, NV. Main duties: aid in development and calibration of predictive water quality model for the Truckee River; statistical analysis of water quality data; identification and quantification of non-point sources of nutrients to Truckee River, NV.

Aug. 1981 -- Sept. 1983. Research Assistant, Univ. of Nev.-Reno. Main duties: design and installation of instrument network to monitor water chemistry and quantity in a small, forested alpine watershed in the Sierra Nevada; water quality sampling; data interpretation and management; preparation of reports, grant proposals, and publications, computer programming for data reduction and storage; mapping of geology, soils and runoff-producing areas; and, training of field technicians.

Feb. -- May 1981. Water Quality Intern, Pima Assoc. of Gov'ts., Tucson, AZ. Main duties: water quality sampling of agricultural production wells; mapping of groundwater levels; and, coordination of sampling efforts.

PROFESSIONAL SERVICE

May 2009 – present. Peer Reviewer for the scholarly journal, Open Forest Science Journal, for papers related to hydrology and forest and watershed responses to disturbance.

Mar. 2013. Invited Panel Speaker, Public Interest Environmental Law Conference: "Public Land Livestock Grazing and Climate Impacts on Aquatic Systems" and "The High Ecological Costs and Low Benefits of Logging Under the Rubric Of Restoration," Univ. of OR, Eugene, OR.

Feb. 2010. Invited Guest Lecturer, Lewis and Clark School of Law course on public lands law: "PACFISH and INFISH and Imperiled Salmonids on Public Lands" Portland, OR.

Feb. 2009. Invited Guest Lecturer, Lewis and Clark School of Law course on public lands law: "PACFISH and INFISH and Imperiled Salmonids on Public Lands" Portland, OR.

Feb. 2008. Invited Guest Lecturer, Lewis and Clark School of Law course on public lands law: "PACFISH and INFISH and Imperiled Salmonids on Public Lands" Portland, OR.

Mar. 2007. Invited Panel Speaker, Public Interest Environmental Law Conference: "Fuel Treatments & Thinning: Its Impacts and Low Priority Relative to Other Needed Restoration

Measures" and "The Impacts of Livestock Grazing on Water Quality and Trout Habitats," Univ. of OR, Eugene, OR.

Feb. 2005. Invited Guest Lecturer, Lewis and Clark School of Law course on public lands law: "Postfire Watershed Management on Western Public Lands" Portland, OR.

Mar. 2004. Invited Panel Speaker, Public Interest Environmental Law Conference: "Postfire Watershed Restoration," Univ. of OR, Eugene, OR.

April 2002. Invited Speaker, Restoring Public Lands Conference: Reclaiming the Concept of Forest Restoration, "Watersheds and Fisheries: Restoration Needs for Trout Habitats," Univ. of CO, Boulder, CO

Mar 2002. Invited Panel Speaker, Public Interest Environmental Law Conference: "Soils, Impacts and Effects on Trout Habitat," Univ. of OR, Eugene, OR

Mar. 2001. Invited Panel Speaker, Public Interest Environmental Law Conference: "NFMA and Salmon Habitat Protection," Univ. of OR, Eugene, OR.

May 2000. Invited speaker, 5th National Tribal Conf. on Environmental Management: "Federal Land Management's Effects on Critical Habitat for Endangered Salmon," Lincoln City, OR

July 1998-2000. Peer Reviewer for the scholarly journal, N. Amer. J. Fish, for papers related to the sedimentation of fish habitat in response to erosion from land uses and fire.

Feb. 1998. Invited Speaker, Oregon AFS Annual meeting: "Adaptive management: Is it really adaptive?" Sunriver, OR

May 1996-2000. Guest lecturer, Oregon State Univ. graduate course on riparian and wetland ecology, Corvallis, OR

Apr.-May 1996. Peer-reviewer for Proceedings of Forest-Fish Conference: Land Management Affecting Aquatic Ecosystems, Proc. Forest-Fish Conf., May 1-4, 1996, Calgary, Alberta, Canada. Nat. Resour. Can., Can. For. Serv. Nort. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-356.

Apr. 1995. Invited speaker, Pacific Rivers Council Workshop on Watershed Analysis and Salvage Logging, Wenatchee, Wash.

Apr. 1995. Invited speaker, Oregon State Univ. Dept of Fisheries and Wildlife Seminar, Corvallis, OR

Apr. 1995. Invited speaker, American Fisheries Society North Pacific International Chapter, Annual Meeting, Vancouver B.C., Can.

Mar. 1995. Invited speaker, American Fisheries Society Idaho Chapter Annual Meeting, Boise, ID.

Nov. 1994. Invited speaker, President's Council on Sustainable Development Workshop, Yakima, WA.

Sept. 1994. Invited speaker, Oregon Water Resources Research Institute Streambank Restoration Conference: "Biological Methods to Stabilize Streambanks--From Theory to Practice," Portland, OR.

Mar.-April, 1994. Peer-reviewer for Henjum et al., 1994. Interim Protection for Late Successional Forests, Fisheries, and Watersheds: National Forests East of The Cascade Crest, Oregon and Washington. The Wildlife Soc., Bethesda, MD.

Jan. 1993-Sept. 1995. Member, Oregon Department of Environmental Quality's (ODEQ) Technical Advisory Committee for Triennial Review of the State Water Temperature Standard.

Mar. 1993. Invited speaker, Northwest Scientific Association Symposium: "Cumulative Effects of Land Management Practices on Anadromous Salmonids," La Grande, OR.

Aug. 1992 - Sept. 1992. Member, Ad Hoc Consultant Selection Committee for Portland Water Bureau Study of Future Water Supply Needs.

May 1992. Invited Speaker, US Forest Service, Pacific Northwest Region, Regional Workshop on Monitoring Soil and Water Resources, Bend, OR.

May 1992. Invited Speaker, Northern Arizona University, School of Forestry, Graduate Seminar Series, Flagstaff, AZ.

Jan. 1991 - Mar. 1995. Member, Technical Work Group: Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration and Monitoring Plan.

Aug. 1989 - Feb. 1990. Member, Technical Advisory Committee to ODEQ for development of definitions for level of beneficial use impairment by nonpoint sources.

May 1989 - Jan. 1991.Member, Nonpoint Source Technical Advisory Committee to Idaho Department of Environmental Quality: Coordinated Nonpoint Source Monitoring Program For Idaho.

PUBLICATIONS

Peer-Reviewed:

Rhodes, J.J., C.M. Skau, and W.M. Melgin, 1984. Nitrate-nitrogen flux in a forested watershed -- Lake Tahoe, USA. In: Recent Investigations in the Zone of Aeration, Proc. of Inter. Symp., Munich, West Germany, 1984, P. Udluft, B. Merkel, and K. Prosl (Eds), pp. 671-680.

Rhodes, J.J., 1985. A Reconnaissance of Hydrologic Transport of Nitrate in An Undisturbed Forested Watershed Near Lake Tahoe. M.S. thesis, Univ. of Nev. Reno, 254 pp.

Rhodes, J.J., C.M. Skau, and J.C. Brown, 1985. An areally intensive approach to hydrologic nutrient transport in forested watersheds. In: The Forest-Atmosphere Interaction, B.A. Hutchison and B.B. Hicks (Eds), pp. 255-270.

Rhodes, J.J., C.M. Skau, D. Greenlee, and D.L. Brown, 1985. Quantification of nitrate uptake by riparian forests and wetlands in an undisturbed headwaters watershed. US Forest Service Gen. Tech. Rept. RM-120.

Rhodes, J.J., C.M. Skau, and D. Greenlee, 1986. The role of snowcover on diurnal nitrate concentration patterns in streamflow from a forested watershed in the Sierra Nevada, Nevada, USA. In: Proc. of AWRA Symposium: Cold Regions Hydrology, Fairbanks Alaska, 1986, D.L. Kane (Editor), pp. 157-166.

Rhodes, J.J., R.L. Armstrong, and S.G. Warren, 1987. Mode of formation of "ablation hollows" controlled by dirt content of snow. J. Glaciology, **33**: 135-139.

Edmonds, R.L., T.B. Thomas, and J.J. Rhodes, 1991. Canopy and soil modification of precipitation chemistry in a temperate rain forest. Soil Soc. of Amer. J., **55**: 1685-1693.

Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, OR

Rhodes, J.J. 1995. A Comparison and Evaluation of Existing Land Management Plans Affecting Spawning and Rearing Habitat of Snake River Basin Salmon Species Listed Under the Endangered Species Act. CRITFC Tech. Rept. 95-4, Portland, OR

Rhodes, J.J. 1996. Description and Evaluation of Some Available Models for Estimating the Effects of Land Management Plans on Sediment Delivery, Channel Substrate, and Water Temperature, CRITFC, Portland, OR

Espinosa, F.A., Rhodes, J.J., and McCullough, D. A. 1997. The failure of existing plans to protect salmon habitat on the Clearwater National Forest in Idaho. J. Env. Management **49**: 205-230.

Rhodes, J.J., and Purser, M.D., 1998. Overwinter sedimentation of clean gravels in simulated redds in the upper Grande Ronde River and nearby streams in northeastern Oregon, USA: Implications for the survival of threatened spring chinook salmon, Forest-Fish Conference: Land Management Affecting Aquatic Ecosystems, Proc. Forest-Fish Conf., May 1-4, 1996, Calgary, Alberta, Canada. Nat. Resour. Can., Can. For. Serv. Nort. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-356, pp: 403-412.

Beschta, R.L., Rhodes, J.J., Kauffman, J.B., Gresswell, R.E, Minshall, G.W., Karr, J.R, Perry, D.A., Hauer, F.R., and Frissell, C.A., 2004. Postfire Management on Forested Public Lands of the Western USA. Cons. Bio., 18: 957-967. http://pacificrivers.org/files/post-fire-management-and-sound-science/Beschta-etal2004.pdf

Karr, J.R., Rhodes, J.J., Minshall, G.W., Hauer, F.R., Beschta, R.L., Frissell,C.A. Perry, D.A, 2004. Postfire Salvage Logging's Effects on Aquatic Ecosystems in the American West. BioScience, 54: 1029-1033. http://www.earthjustice.org/library/reports/the-effects-of-positive-salvage-logging.pdf

Rhodes, J.J. and Odion, D.C., 2004. Comment Letter: Evaluation of the Efficacy of Forest Manipulations Still Needed. BioScience, 54: 980.

Rhodes, J.J., 2005. Comment on "Modeling of the interactions between forest vegetation, disturbances, and sediment yields" by Erkan Istanbulluoglu et al. J. Geophys. Res. Earth Surf., Vol. 110, No. F1, F01012 10.1029/2004JF000240

Rhodes, J.J., 2007. The Watershed Impacts of Forest Treatments to Reduce Fuels and Modify Fire Behavior. Pacific Rivers Council, Eugene, OR http://pacificrivers.org/science-research/resources-publications/the-watershed-impacts-of-forest-treatments-to-reduce-fuels-and-modify-fire-behavior

Rhodes, J.J. and Baker, W.L., 2008. Fire probability, fuel treatment effectiveness and ecological tradeoffs in western U.S. public forests. Open Forest Science Journal, 1: 1-7. http://www.bentham.org/open/tofscij/openaccess2.htm

Beschta, R.L., Donahue, D.L., DellaSala, D.A., Rhodes, J.J., Karr, J.R., O'Brien, M.H., Fleischner, T.L., and Deacon-Williams, C. 2013. Adapting to climate change on western public lands: Addressing the ecological effects of domestic, wild, and feral ungulates. Env. Manage. 51:474–491 DOI 10.1007/s00267-012-9964-9 http://www.uwyo.edu/law/directory/_files/donahue.pdf

Technical Reports:

1986. Annual Report on Watershed Studies at Olympic National Park. College of Forestry, Univ. of Wash., Seattle, Wash. (Co-authors: R.L. Edmonds, T.B. Thomas, T.W. Cundy)

1987. Annual Report on Watershed Studies at Olympic National Park. College of Forestry, Univ. of Wash., Seattle, Wash. (Co-authors: R.L. Edmonds, T.B. Thomas, T.W. Cundy)

1988. Annual Report on Watershed Studies at Olympic National Park. College of Forestry, Univ. of Wash., Seattle, Wash. (Co-authors: R.L. Edmonds, T.B. Thomas, T.W. Cundy)

1989. Annual Report on Watershed Studies at Olympic National Park. College of Forestry, Univ. of Wash., Seattle, Wash. (Co-authors: R.L. Edmonds, T.B. Thomas, T.W. Cundy)

1990. Coordinated Nonpoint Source Monitoring Program For Idaho. Idaho Dept. of Environmental Quality, Boise, Idaho. (Co-authors: B. Clark, D. McGreer, W. Reid, T. Burton, W. Low, I. Urnovitz, D. McCullough, T. Litke)

1992. The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration and Monitoring Plan. Wallowa-Whitman National Forest, Baker, OR (Co-authors: M. Purser, P. Boehne, R.E. Gill, R.L. Beschta, J.R. Sedell, B. McIntosh, J. Zakel, J.W. Anderson, D. Bryson, S. Howes, R. George).

1992. Salmon Recovery Program for the Columbia River Basin: An Advisory Report for the US Congress, Col. Riv. Inter-Tribal Fish Comm., Portland, OR (Co-authors: P.R. Mundy, D.A. McCullough, M.L. Cuenco, T.W. Backman, D.Dompier, P. O'Toole, S. Whitman, E. Larson, B. Watson, G. James).

1993. A comprehensive approach to restoring habitat conditions needed to protect threatened salmon species in a severely degraded river--The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration and Monitoring Plan. USFS Gen. Tech. Rept RM-226, pp. 175-179. (Co-authors: J.W. Anderson, R.L. Beschta, P. Boehne, D. Bryson, R.E. Gill, S. Howes, B. McIntosh, M.D. Purser and J. Zakel).

1993. Dante's Video Guide to Habitat Conditions for Wild Spring Chinook Salmon, Steelhead and Bull Trout in the John Day Basin, Oregon. (Video) Presented at AFS National Meeting, Portland, Or, Aug. 29-31. (Co-authors: R. Taylor and M. Purser).

1995. Wildfire and Salvage Logging: Recommendations for Ecologically Sound Post-Fire Salvage Logging and Other Post-Fire Treatments on Federal Lands in the West. Pacific Rivers Council, Portland, OR (Co-authors: R. Beschta, C. Frissell, R. Gresswell, R. Hauer, J. Karr, G. Minshall, D. Perry).

1998. Adaptive management: Is it really adaptive? Abstracts: Oregon AFS Annual Meeting, Feb. 11-13, 1998, p. 31.

1998. Thinning For Increased Water Yield in the Sierra Nevada: Free Lunch or Pie in the Sky? Pacific Rivers Council, Eugene, OR. (Co-author: M. Purser)

1999. Annual Project Report: Watershed Evaluation and Aquatic Habitat Response to Recent Storms. Bonneville Power Administration (BPA), Portland, OR. (Co-author: C. Huntington)

1999. Annual Project Report: Monitoring Fine Sediment in Salmon Habitat in John Day and Grande Ronde Rivers. BPA, Portland, OR (Co-author: M. Purser)

2000. Annual Project Report: Watershed Evaluation and Aquatic Habitat Response to Recent Storms. BPA, Portland, OR. (Co-author: C. Huntington)

2000. Annual Project Report: Monitoring Fine Sediment in Salmon Habitat in John Day and Grande Ronde Rivers. (Co-author: M. J. Greene)

2001. Annual Project Report: Monitoring Fine Sediment in Salmon Habitat in John Day and Grande Ronde Rivers. BPA, Portland, OR. (Co-author: M. J. Greene)

2001. Imperiled Western Trout and the Importance of Roadless Areas. Western Native Trout Campaign, Center for Biological Diversity, Tucson, Az. (Co-authors: J. Kessler, C. Bradley, and J. Wood)

2002. Tryon Creek Watershed: Overview of Existing Conditions, Data Gaps, and Recommendations for the Protection and Restoration of Aquatic Resources. West Multnomah Soil and Water Conservation District, Portland, OR

2002. An Analysis of Trout and Salmon Status and Conservation Values of Potential Wilderness Candidates in Idaho and Eastern Washington. Western Native Trout Campaign, Center for Biological Diversity, Tucson, AZ. (Co-authors: C. Bradley, J. Kessler, C. Frissell)

2003. Stream and Fish Habitat Conditions in Tryon Creek: Their Likely Causes and Ramifications for Salmonids. Proceedings of Urban Ecology and Conservation Symposium, January 24, 2003, Portland, OR. Portland State University, Environmental Sciences and Resources, Portland, OR

2008. Primary Sources of Fine Sediment in the South Fork Stillaguamish River. Interim progress report for Washington State Salmon Recovery Funding Board, Olympia, WA. Snohomish County Public Works Surface Water Management, Everett, WA. (Co-authors: M. Purser, B. Gaddis, S. Britton, T. Coburn, and M. Rustay)

2009. Primary Sources of Fine Sediment in the South Fork Stillaguamish River. Project completion report for Washington State Salmon Recovery Funding Board, Olympia, WA. Snohomish County Public Works Surface Water Management, Everett, WA. (Co-authors: M. Purser, B. Gaddis,)

Semi-Technical Publications:

1993. Dam the analysis--heal streams instead. The Assoc. of Forest Service Employees for Env. Ethics Inner Voice, **5**(6): 1, 4-5.

1994. Invited Preface to Northwest Science Special Issue--Environmental History of River Basins in Eastern Oregon and Washington. Northwest Sci., **68**.

PROJECT MANAGEMENT

1993-1996. Technical Assistance Contract with NMFS to produce technical guidance for ESA consultations for effects of land management on critical habitat for listed Columbia basin salmon. Main duties: Co-Primary Investigator; primary author of peer-reviewed reports including proposed ESA consultation guidelines for effects on salmon habitat (Rhodes et al., 1994), evaluation and comparison of compatibility of land management plans with protection of critical salmon habitat (Rhodes, 1995), and evaluation of models for estimating land management effects on salmon habitat (Rhodes, 1996); review and synthesis of available scientific literature; budget preparation and tracking; coordination with subcontractors and grantor representatives. Total budget: $230,000.

1998-2000. Watershed Evaluation and Aquatic Habitat Response to Recent Storms. Main duties: Primary Investigator; design and implementation of monitoring methods, coordination of technical staff in 10 watersheds with differing levels of grazing and logging in 3 subbasins in Idaho, Washington, and Oregon; technical training; data analysis; contract administration; proposal development; report preparation; budget development and tracking; coordination with grantor representatives. Total budget: $164,000.

1998-2000. Evaluation of Effects of Grazing on Rate of Salmon Habitat Recovery. Main duties: Primary Investigator; design and implementation of monitoring methods, training of field technician; data analysis and synthesis; proposal development; preparation of progress reports; budget development and tracking; coordination with grantor representatives. Total budget: $73,000.

1998-2001. Monitoring Fine Sediment Levels in Salmon Habitat in Grande Ronde and John Day Rivers. Main duties: Primary Investigator; design and implementation of methods for monitoring fine sediment levels in four rivers; field technician training; data analysis and synthesis; subcontract administration; proposal development; progress and technical report preparation; budget development and tracking; coordination with grantor representatives. Total budget: $128,000.

2001-2002. Western Native Trout Campaign, Aquatic Scientist and Coordinator. Main duties: Oversight and scientific integrity assurance for all work products; coordinate conservation efforts among campaign member organizations and other groups working to protect and restore trout habitats and populations; reporting; and, budget tracking. Total budget: ca. $1,000,000.

HONORS AND AWARDS

1996. Leadership and Excellence. Col. River Inter-Tribal Fish Comm., Portland, OR

1991. Employee of the Year. Col. River Inter-Tribal Fish Comm., Portland, OR

1984. Academic Recruitment Scholarship for Outstanding Graduate Prospect. Univ. of Wash, Seattle, Wash.

1982. Maxey Award -- Outstanding Graduate Student Paper in Hydrology. Univ. of Nev.-Reno.

1980. Winslow and Myron Reuben Scholarship for Outstanding Undergraduate in the Earth Sciences. Univ. of Ariz., Tucson, Az.

ADDITIONAL TRAINING

1993. USFWS Water Temperature Modeling via SNTEMP

1991. USFWS Introduction to IFIM Investigations